? Secret Number ?

OVERVIEW

In the SECRET NUMBER family of cooperative logic problems, students in Grades 2–4 become "number detectives." They try to find a particular number that has all the properties listed on their clue cards. As each clue is read, the detectives record the information on the Fifty or Hundred charts. They cross out numbers that are eliminated by the clues until only one number remains. Then, the group checks again to confirm that the secret number has all of the characteristics listed on the clues. The Fifty and Hundred charts provide visual evidence that the case has been solved.

Skills

- Counting by 2's, 5's, 7's, 10's, and 20's
- Greater than, less than
- Use of Fifty and Hundred charts
- Place Value
- Deductive reasoning
- Communication

Concepts and Vocabulary

- **Numeration and Computation:** greater than, less than, larger than, more than, odd, even, digit, ones' place, tens' place, add, sum, half, count by ... (skip counting)

	Suggested Grade Levels					
Activity	**K**	**1**	**2**	**3**	**4**	**5**
Secret Number A–C			✓	✓	✓	
Secret Number D				✓	✓	
Secret Number E–H				✓	✓	✓

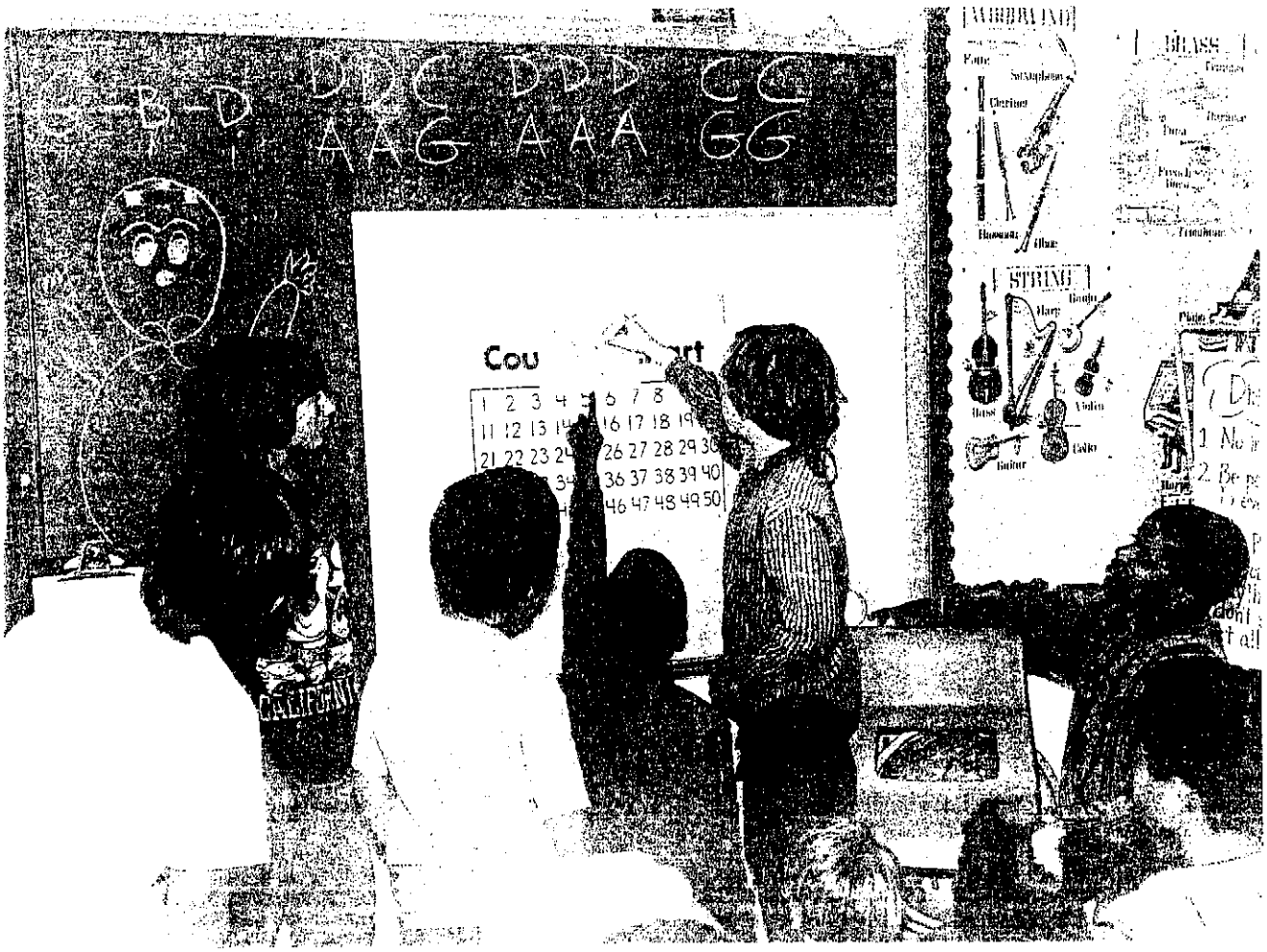
Logic activities in this section are designed for **Grades 2-4**. However, teachers in **Grade 1** can use the introductory activities to help students become familiar with the Hundred Chart and number patterns. **Kindergarten** students can use a number line from one to ten or twenty to explore the concepts of larger and small numbers; and the order of numbers (for example, nine comes before ten; seven is between six and eight).

NOTE: The Hundred Chart is an essential tool for numeration, computation, place value, mental math and patterning for students in Grades 2-4. Although students at this level should be able to use the Hundred Chart, we use the Fifty Chart in Secret Number A-C to simplify the process of elimination. These three first problems also utilize beginning number patterns and concepts (for example, counting by 5's; odd/even).

GETTING READY

Each cooperative group will need the Fifty Chart (**Secret Number A–C**) or Hundred Chart (**Secret Number D–H**). The charts are at the end of this section. Students will need a marker or pencil to eliminate numbers as clues are revealed. You may wish to laminate a class set of Hundred Charts and have students use grease pencils or "dri-mark" pens to cross out the numbers. These charts can then be re-used after they are erased.

OPTION: You may wish to make an overhead transparency of the Hundred Chart to demonstrate how to eliminate numbers that don't fit the information from the clues.



A **large laminated Wall Chart** is an additional teaching tool to help students see number patterns and learn how to eliminate numbers on their individual Hundred Chart. (See page 138 for sources of where to purchase the wall and laminated student charts.)

INTRODUCTORY ACTIVITIES

Exploration of the Hundred Chart

Distribute a Hundred Chart to each student. Have students work with partners to look closely at the chart and list their discoveries. For example: "There are numbers all over the chart. The highest number is 100. The lowest number is 1. There are 10 rows of numbers. There are ten numbers in each row. Every number that is under the `5' has a five in the ones' place." Create a list of the students' discoveries.

Chart Patterns

Distribute a Hundred Chart to each student. Have students work in partners to color in patterns on the Hundred Chart. If a large Hundred Chart is available, have students show their patterns to the class. Appropriate patterns include:

Grade 2: Counting by 2's, 5's, 10's
Grade 3: Counting by 2's, 3's, 4's, 5's, 10's, 20's
Grade 4: Counting by 2's, 3's, 4's, 5's, 6's, 7's, 8's, 9's, 10's, 20's.

If students have difficulty counting, they can cover numbers on the chart with beans or counting chips. For example, if a student is counting by 3's, she will cover the first two numbers and color in the third. You can also count and clap number patterns. For example, for the number 3, students would count "1, 2" and clap as they say "3." Then they'd continue to count "4, 5" and clap as they say "6."

Guess My Number

Use this game to reinforce key vocabulary and concepts from Secret Number activities. Write the numbers from one through ten on the chalkboard or display them on a large Hundred Chart. Explain to the students that you are thinking of a number between one and ten. Tell them that they can guess your number by asking "yes" or "no" questions, for example: "Is it even? Is it less than five? Do you get to it when you count by 5's?" As each question is asked, cross out numbers that are eliminated by the answer to the question. Tally the number of questions it takes for the students to guess the number.

When students become proficient at the game, increase the range of numbers to 20, 50 and 100. Have students use Fifty or Hundred charts to eliminate numbers. You may also ask volunteers to choose numbers and conduct the game with their classmates.

TIPS FOR TEACHERS

Recording the Clues

The Secret Number family requires students to use the Hundred Chart to record information from their clues. This process can be difficult for some students. It is essential that you model the use of the Hundred Chart before you proceed with Secret Number activities. "Guess My Number" (see "Introductory Activities") is a perfect game to help students learn to eliminate numbers and record possibilities on the Hundred Chart.

You may also wish to model a sample Secret Number activity with the entire class. Choose four students from different groups. Give each student a clue card from **Secret Number–A**. Choose a fifth student to work with a large Hundred Chart in the front of the room or a small Chart at the overhead projector. Distribute a Fifty or Hundred chart to each student. Have one student read her clue card, ("The number is greater than 20"). Ask the class what numbers are eliminated by this clue (1–20) and have them cross out these numbers on their charts. Proceed with each of the other three clues. Stop several times to ask students why a particular number has been eliminated. Be sure to emphasize that once a number is crossed out, it cannot be used, even if it fits another clue, for example, the number "18" has already been eliminated by the first clue. It cannot be re-used when a new clue states that "you get to the number when you count by 2's").

Other Logistics

It may be helpful to point out that some clues eliminate many numbers (for example, the number has a 3 in it) and others eliminate fewer numbers (for example, the number is greater than 10). Groups may find that if they first read all four clues, they can better determine which clue to use first. Students will also need to decide who will record the clues on the Hundred Chart. The chart can move from student to student as each clue is read. Then, the reader of the clue becomes the recorder of the information. The recorder can also be a designated person in the group or a fifth person (if the group has an extra member). Then, a new recorder can be selected for each activity.

ASSESSMENT

Have students color in a pattern on the Hundred Chart, name the pattern and describe it.

Give the students a list of clues. Have them use the clues to pinpoint a specific number, for example, "The number is less than 30. You get to the number if you count by 10's. The number has a 2 in the tens' place. What is the number?"

Give the students a number, for example, 15. Ask students to describe the number in as many ways as they can, for example, "It is odd. It has two digits. You get to the number if you count by 3's and 5's. There is a five in the ones' place."

GOING FURTHER

Number Search

Ask students to choose a number within an age-appropriate range (for example, one to ten for Grade 2) and list clues that will help a classmate guess the number. For example, if the number is 8, a student might write: "It is even. It is two more than six." Then, have students trade clues and search for numbers.

Name My Pattern

Have each student color in a pattern on the Hundred Chart. Then, ask students to trade patterns and try to name their classmates' patterns.

Number Facts

This activity does not use a Hundred Chart but will reinforce concepts from Secret Number activities. Have students find interesting number facts (within an age-appropriate range of numerals) from a textbook, almanac, encyclopedia or the *Guinness Book of World Records*. Ask them to create a series of clues that will help their classmates guess the number. For example, the longest jump by a flea was 13 inches. Appropriate clues for this fact would include: "The number has two digits. Both digits are odd. The digit in the ones' place is two more than the digit in the tens' place. The number is less than twenty."

The clues should narrow down the number to several possibilities. Classmates will then read the clues and make a reasonable guess that fits the information. After the guesses are reviewed and revised if necessary, the fact can be revealed.

Secret Number - A

The number is greater than 20.

Secret Number - A

The number is less than 40.

Secret Number - A

You get to the number if you count by 5's.

Secret Number - A

You get to the number if you count by 2's.

TEACHER NOTES: Each group will need a Fifty chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers.

Secret Number - B

The number is greater than 25.

Secret Number - B

The number has a "4" in it.

Secret Number - B

The number has a "3" in it.

Secret Number - B

The number is even.

TEACHER NOTES: Each group will need a Fifty chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers.

Secret Number - C

The number is odd.

Secret Number - C

The number is greater than 10.

Secret Number - C

The number is less than 20.

Secret Number - C

You get to the number if you count by 5's.

TEACHER NOTES: Each group will need a Fifty chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers.

Secret Number - D

The number is less than 80.

Secret Number - D

The number has two digits.

Secret Number - D

The digits in the number are the same.

Secret Number - D

If you add the digits, the sum is 12.

TEACHER NOTES: Each group will need a Hundred chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers. You may need to review the meaning of the word "digit" before students solve the problem.

Secret Number - E

You get to the number if you count by 5's.

Secret Number - E

The number is even.

Secret Number - E

The digit in the tens' place is larger than the digit in the ones' place.

Secret Number - E

If you add the digits, the sum is 5.

TEACHER NOTES: Each group will need a Hundred chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers. You may need to review the meaning of the word "digit" before students solve the problem.

Secret Number - F

You get to the number if you count by 10's.

Secret Number - F

The number is even.

Secret Number - F

You get to the number if you count by 20's.

Secret Number - F

If you add the digits, the sum is 1.

TEACHER NOTES: Each group will need a Hundred chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers. You may need to review the meaning of the word "digit" before students solve the problem.

Secret Number - G

The number is on the top half of the 100 chart.

Secret Number - G

The number is odd.

Secret Number - G

If you add the digits, the sum is 8.

Secret Number - G

The digit in the ones' place is 2 more than the digit in the tens' place.

TEACHER NOTES: Each group will need a Hundred chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers. You may need to review the meaning of the word "digit" before students solve the problem.

Secret Number - H

The number is on the bottom half of the 100 chart.

Secret Number - H

The digit in the tens' place is even.

Secret Number - H

The digit in the ones' place is odd.

Secret Number - H

The sum of the digits is 17.

TEACHER NOTES: Each group will need a Hundred chart for this activity. Be sure to model how to use the chart. Markers or crayons are helpful for students to use to eliminate numbers. You may need to review the meaning of the word "digit" before students solve the problem.